

THE SABBATH.

This is the day of rest;
Our falling strength renew;
On weary brain and troubled breast
Send Thou thy freshening dew.

This is the day of peace;
Thy peace our spirits fill;
Bid thou the blasts of discord cease,
The waves of strife be still.

This is the day of prayer;
Let earth to heaven draw near;
Lift up our hearts to seek thee there;
Come down to meet us here.

This is the first of days;
Send forth thy quickening breath,
And wake dead souls to love and praise,
O vanquisher of death!

—John Ellerton.

A Dangerous Courtship.

TRANSLATED BY ALEX. SCHAAPE.
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Since Aslaug, Knut Husaby's pretty daughter, had grown into a young and charming woman, there was little peace in the village of Husaby. Day and night the hardy lads of the neighborhood engaged in wordy and fistic quarrels on her account. The climax was reached in the inn on Saturday night, when some of the boys had imbibed too much.

Knut Husaby would not think in those days of going to sleep on Saturday night without keeping his big leather boots on. He was also sure to have a heavy oak cane next to his bed for emergency, as he called it. "Since God has bestowed a pretty daughter on me, it will be my duty to keep her from harm," he would say.

There Naeset was the son of the butcher, a strapping young fellow, full of grit and daring. Gossips said that Thore visited Aslaug more frequently than did any of the other young men of the village. This rumor did not please Knut. In fact, he denied it, saying that he had never seen Thore and Aslaug together. But the people laughed and winked at this. They insisted that Thore was a sly lover and that Aslaug knew how to hoodwink her father.

The spring came, and Aslaug drove the cattle to the top of the Alm mountain. As the sun slowly descended in the horizon and far above the steep, cool rocks of the mountain, the bellowing of the cows, the barking of the dog, and the fiddle of Aslaug resounded over the valley, the lads, who were working in the meadows, felt as if they would like to cut away their scythes and pitch forks and rush up the steep paths to court the fair alder.

When Saturday night came there was a race between them to reach the mountain top, but they descended much more rapidly, for behind the door of the cattle shed a stalwart figure was hidden, who gave each and every caller a pugilistic reception, and told them that if they wanted a more severe drumming at another time to call again.

The wipers knew that there was only one man in all Husaby who could boast of the possession of such a strong fist as that possessed by Thore Naeset. Some of the rich peasants



"What do you want of me?"

sons of the neighborhood thought that it was a shame that this common butcher was permitted to lord it thus on top of the mountain and to keep all wooers away from the beautiful Aslaug.

Old Knut was of the same opinion when he was told of the bold doings of Thore and he boasted everywhere that if there was no one in Husaby who could conquer Aslaug's favorite, he and his son would show that they could do it in short order.

Knut, it is true, was beginning to age visibly. He was 60 years old, but despite this he would now and then engage in a bout with his son in the barn yard, and prove a formidable antagonist.

Only one path led to the top of the Alm, and it wended its way across Knut's farm. On the following Saturday night when Thore wanted to ascend the mountain and was passing by the side of the barn, he suddenly felt the grip of a strong arm around his throat.

"What do you want of me?" asked Thore. He swung himself around dextrously and threw his assailant into the ditch.

"You will know soon enough what we want of you," said another, who dealt him a severe blow on his breast. This was Aslaug's brother.

"Here comes the third one," rejoined Old Knut, who had meanwhile managed to extricate himself from the bushes, and with them Thore received another telling blow.

In the face of danger Thore's strength was doubled. His prowess came him to stand, for two muscular giants had attacked. In the end, however, despite his agility and force, Thore got

a hard beating and when blood began to flow freely Knut called a halt and ended.

"Now, Thore, if you can beat my brother, Wolf Husaby, and his son next Saturday night, then my lass will be yours."

There was so badly injured that he had to remain in bed over Sunday. On Monday also he was so worn out from the fight that he was not able to go to work in his father's shop. Tuesday came. It was a balmy day. The sunshine brightened his room. He heard the bells of the grazing cattle and his beloved warbled her pretty Norse songs and yodels till he thought his heart would break.

Wednesday came and he still languished on his couch. He did not become convalescent until Saturday morning, and then he was not well enough to meet Knut's challenge to battle with his big brother and nephew. He looked longingly toward the narrow path which led to the side of Aslaug. His sweetheart's yodel again thrilled through the silent valley. He knew that if he would attempt to make his way to her that evening he would receive another drubbing that would send him to bed for some time to come.

"I must climb the Alm some other way," reasoned Thore. Toward dawn he unmoored his boat and rowed along the shore of the almost perpendicular rock, hoping against hope to find some foothold and some way of ascending the Alm from the water side.

After the day's work Aslaug sat on the summit of the mountain. She did not anticipate that Thore would be



Aslaug sat on the summit of the mountain.

able to come to her that night, but she knew that others would come in his stead. She unchained her faithful shepherd dog and began to knit. She was sitting with her face turned toward the home of Thore, but the mist began to rise so that she could not even distinguish the tree tops. She moved over to the other side, and there she sat dreaming for a long time with her eyes riveted on the vast sea. The view filled her soul with unspeakable peace.

Suddenly she felt a desire to give vent to her feelings in loud melody. She sang the songs of childhood, the ditties of the village, the Norse national song, and her music sounded weird in the silent night. Then she thought that some one was answering her.

"What in the world can this be?" she asked herself. "It cannot be the echo, for I am facing the sea." She advanced to the edge of the rock and swinging her arms around a slender tree she searched the wall of the steep mountain. But it was quiet and peaceful on the fjord; not a bird flew over it.

Aslaug returned to her grassy couch and again began to sing. This time she could not be mistaken, for it was indeed a human voice that responded to her yodel.

Again she rushed to the tree and took a long look down the Alm. At least she beheld a boat moored to a small branch that jutted out from the rock. Only some fifty feet below her, she saw a red cap, with a man under it making his way up the slippery side when not even a mountain goat would dare to tread.

She hurried back to her place, and dared not utter a note or word for fear that the intrepid wooer would be buried down into the turbulent waters of the fjord. She knew very well who it was, though she did not see his face. She threw herself on the ground and held the long, heavy blades of grass with both hands, as if it were her task not to lose her grip on what was once seized. But the grass roots began to loosen and in her despair she cried to God to aid Thore with His Omnipotence. Then again she began to think that such an act of Thore and such a prayer on her part were a gross temptation of God. Nevertheless she continued her supplications. "Only this time, dear Father in heaven, only this time," she cried.

Then Aslaug slung her arms around the dog as if it was Thore whom she was trying to save from destruction. How long the time seemed! At last the dog tore himself loose and began to bark lustily.

"Hush," she warned, but the dog would not be quieted and when she had reached the animal to stop his noise the red cap peeped over the edge of the rock and the next minute Thore held her in his arms.

They kissed and embraced each other again and again, and Thore could not utter a word, and what he finally said contained not an idea of rationality.

Old Knut Husaby, however, when he heard of Thore's falling feat, said something in which there was plenty of common sense: "The lad is worthy of her—she shall be his."

Every dog has his day and every man has his hobby.

REMARKABLE STEAMSHIP.

The Powerful Ice Breaker "Baikal" Carries Three Trains.

The great English firm of Sir William Armstrong, Whitworth & Co., has built upon Lake Baikal one of the most remarkable steamships in the world to ferry the Siberian trains across the lake, and in winter to break the ice at the same time. This was brought out in pieces from Newcastle-on-Tyne, and put together by English engineers, who have been living in this remote and lonely spot for over two years. The "Baikal," as the steamer is called, is a magnificent vessel of 4,000 tons, with twin engines amidships of 1,200 horse-power each, and a smaller engine forward, to drive the screw in the bow; for the principle of the new type of ice-breaker is to draw out the water from under the ice ahead by the motion of a bow screw, when the ice collapses by its own weight and a passage is forced through the broken mass by the impact of the vessel. As will be seen from my illustrations, the first that have been published, the "Baikal" has extensive upper works, and these contain luxurious saloons and cabins. Upon her deck she will carry three trains—a passenger train in the middle and a freight train on each side. Her speed is thirteen knots, and on her trial trips she has shown herself capable of breaking through solid ice thirty-eight inches thick, with five inches of hard snow on the top—such snow is much more difficult to pierce than ice—and has forced her way through two thicknesses of ice frozen together, aggregating from fifty-six to sixty-five inches. In summer her bow propeller should be removed, and large propellers substituted for her smaller winter ones; but so far the railway authorities have taken no steps to build a dock upon the lake, without which neither of these important changes can be effected, nor the steamer herself repaired if any mishap should damage her hull. Lake Baikal is frozen from the middle of December to the end of April and there is also talk of laying a railway across upon the ice, as is done each year from St. Petersburg to Kronstadt; but probably all depends upon the success of the ice breaker next winter.—From "Russia of Today," by Henry Norman.

WRITING A TRADE.

Reflections for the Benefit of Would-Be Authors.

All the men and women that have risen to distinction in the field of letters have served apprenticeship in the technique of the art before they reached the ear of the public. The poets alone seem to have a gift of speech at the outset and even they learn much in the course of years and practice. But the young aspirant should not model his line of procedure on that followed by the acknowledged geniuses. Only genius can hope to imitate genius. For ordinary talent there is no royal road to literary mastery. The art of writing must be studied diligently, painfully, humbly. The use and abuse of words and phrases must be considered, not for a day, but for many years. The formation of sentences must be the thought of one's waking hours. The manufacture of a style is the labor of years. The old saying that "style is the man" is perfectly true, but it has deluded many a youngster into the belief that all he had to do was to express himself according to the impulse of the moment, just as he would in talking, and that thus he would be a writer. "Style is the man." It is not the best. It is the reflex of the mature mind, the embodiment of thought, which no longer stumbles, but walks with sure feet, and makes for itself a broad and beautiful path of words. Let those that are wondering why their effusions do not burst into print at once stop and consider whether they really have anything particular to say, and then whether they have any particular way of saying it. There are more persons with something to say (perhaps not something immortal, but still worth saying) than there are with a genuine master of literary expression. The latter does not come by nature; nor does it come with experience. It comes only by practice, and not an easy practice at that. It was that most literary of all recent writers, Robert Louis Stevenson, who said that the man not willing to spend a whole afternoon in search of the right word to express an idea is unfit for the business of literature.—New York Times.

Ball-Bearing Watch.

One of the most ingenious devices at the Paris fair is to be seen in the Swiss watch factory exhibit and consists of a ball-bearing pocket time-piece. The principle has already been applied to the driving wheel of the clockmaker's throw and also for the winding arbor of clocks. Its application to a watch, however, with satisfactory results requires exceedingly fine mechanism and minute balls. The watch was made by Leon Gruet, a foreman of a Parisian watch concern. In it the arbors roll on steel balls of two sizes. It is spoken of by competent authorities as one of the most interesting horological exhibits.

Crowds and the Fish.

A London servant girl was sent on the day of Cromie's surrender to the local fish monger's for fresh herrings. The town rang with the news, but Mary Jane minded her business, and that only. "They've got Cromie," remarked the fish monger, as he wrapped up her "five for threepence." Home took the maid, and laid her purchases before her mistress. "Here they are, ma'am," she exclaimed; "but I don't know how they'll do. The fish monger said they'd got Cromie!"

FARM AND GARDEN.

MATTERS OF INTEREST TO AGRICULTURISTS.

Some Up-to-Date Hints About Cultivation of the Soil and Fields Thereof—Horticulture, Viticulture and Floriculture.

Our Wheat.

C. B. Hoffman says: There are four great divisions of wheat in the United States—the spring wheats, the hard winter wheats, the soft winter wheats and the California white wheat. Each of these divides and subdivides into many kinds and varieties. Among the spring wheats is the northern hard, chiefly grown in the Dakotas. The softer varieties grow in Wisconsin, Michigan, Nebraska, and, to a limited extent, in Kansas. The soft or red varieties are numerous and are grown in every winter wheat growing state, Virginia, New York, Pennsylvania, Kentucky and Ohio grow a superior quality. Michigan, Wisconsin and Illinois winter wheats are not as good. The California white wheat is a spring wheat and is grown almost exclusively in all the mountain states of the west, extending down to the tropics on the cool mountain plateaus of Mexico. It is a white wheat, makes a light flour, deficient in strength, but excellent for Graham.

Kansas grows both hard and soft winter wheat, and a very limited quantity of a few varieties of spring wheat. Kansas is the only state that grows hard winter wheat in quantities worth mentioning. This is unique and deserves consideration. In fact, upon this I think depends the supremacy which Kansas holds over all other states, and will continue to hold in the production of wheat.

Russian wheat, as it is commonly called, although it has several other names in different localities, as Turkey, Hard Wheat, Hungarian, etc., was first brought to Kansas by the Russian Mennonites, who came to the state in large numbers 20 or 25 years ago. For years after its introduction it was disparaged by millers and grain buyers, but its hardness and almost unending yield caused it to be grown in ever-increasing areas in spite of the lower price it commanded. Finally, about 16 years ago, some of the progressive millers discovered the superior qualities of this much-despised wheat, and adapted their machinery, which required a general remodeling of their entire plants, and began the manufacture of Kansas hard-wheat flour, since become famous in the world's markets as superior to any other grade manufactured in the United States, and equal to the world-famous Hungarian flour made from the choicest wheat grown in Hungary and Bohemia. The best variety of hard winter wheat is the Crimean.

"What kind of seed shall I sow?" is a question the importance of which is underrated by many farmers. Seed wheat should be pure—that is, of one variety. It should be well-matured, full-grown, and free from smut or other parasite or fungoid growths. It should also be free from weed seeds, especially chaff ("cheat"), which, being exceedingly hardy and prolific, will take the field if it has half a chance, and is exceedingly difficult to eradicate when once it has infested a neighborhood. Poor, shriveled wheat, if sufficiently matured to sprout, will, under favorable conditions, produce a good crop, but will surely cause the variety to "run out" in a very few years if continued sowing of inferior stuff is indulged in. A farmer should have a seed patch on which he grows wheat for seed. This he should give the best care, should plow deep and early, keep it free from weeds, use the best varieties and the purest seed, and from the products of this sow his larger fields. He might, with much advantage, plant different varieties and sow his general fields only with such as have proven themselves suited to that locality. He could at comparatively small cost, exchange seed with other farmers from time to time, and in that manner grow the very best quality and largest quantity.

Choosing seed from one locality to another is desirable; even from one neighborhood to another; still better from distant parts; usually from northern localities to southern is better than from southern to more northern.

Abandoned Farms.

Every once in a while we notice reports of what certain men have done on so-called abandoned farms. Often the returns from the land are quite phenomenal. The explanation is that some man with both brains and money has taken hold and put into practice business methods. Had these been put into operation from the first there would have been no abandoned farms. Men that have investigated the conditions in localities where such lands have been thrown out of cultivation have found that the lands had become run down through constant cropping without putting back the manure necessary to keep up the fertility. What is true of the West is equally true of the East, and unless the methods on some of our farms change, the time is coming when the farms will cease to give a living. There are two unfortunate classes of men that try to run farms; those that have money and no brains for agricultural enterprises, and those that have brains and no money. The latter class is, however, of the two the most likely to succeed. In these days of agricultural colleges, experiment stations and abundant opportunities there is no reason why the man that has money cannot obtain the necessary brain development, to help make a success of farming.

Squash Vine Borer.

We present two groups of illustrations of the squash-vine borer. The first shows the larva and eggs. In the second illustration "a" is a male moth, "b" female with wings folded in natural position when at rest; "c" eggs shown on bit of squash stem; "d" full-grown larva, in situ in vine; "e" pupa; "f" pupal cell; all about double natural cell.

The accompanying illustrations show the great difference between the newly-hatched larva, the half-grown larva, and the mature form.

Ordinarily the larva works in the woody parts of the stem, boring in

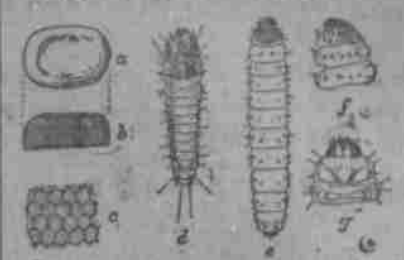
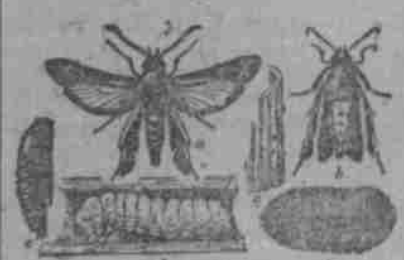


Fig. 1. a, male moth; b, female moth; c, eggs; d, full-grown larva; e, pupa; f, pupal cell. a, b, c, d, e, f, all about double natural cell.

both directions and appearing to prefer the portion near the roots.

Ordinary insecticides are of no value against this insect. When once it has entered the vine, and repellents are practically useless. The measures that have been found of greatest value are not to plant on infested ground, to plant early varieties for the protection of late squashes; to harrow infested fields late in the fall and plow deeply in spring, or reverse the process to prevent the moths from laying; to encourage the growth of secondary



roots by covering the vines at the joints with earth; to destroy dead vines and old plants as soon as the crop is made; to keep the plants in vigorous condition, free from other insects and diseases; to cut out such borers as may succeed in entering the vines; and to capture the moths early in the morning or toward dusk when they are less active than in the heat of the day.

Horticultural Observations.

A factory is being constructed in California for the making of what is to be called "concentrated fruit." It is said that over-ripe apples and small ripe apples are to be used and made marketable in that way. If it proves a success it will help at least to settle the question of disposal of unmarketable fruit.

An English horticulturist, speaking on what to do with inferior apples and how to dispose of them without injuring the market, says that the best way is not to grow them. The answer is one of those sayings that attempts to answer a question without answering it. We do not intend to grow inferior apples, but we do grow them in spite of ourselves, and the problem arises of how to dispose of them without loss. Feeding to cattle is one way suggested, as apples have the same feeding value as turnips. This is a good way to get rid of them if getting rid of them is the principal object.

A man in South Haven, Michigan, has brought suit for \$200 against another man for damage done to his peaches by bees belonging to the man sued. The first man claims that his neighbor keeps 60 hives of bees and that they come into his peach orchard and bite through his peaches, thus rendering them unmarketable. It is the old question of whether or not bees can injure peaches. The question has generally been answered in the negative.

Southern California seems to be enjoying a prosperous year so far as the fruit industry is concerned. Three years ago the number of cars of fruit shipped out was 14,176; last year it was 24,469 cars and this year 26,470 cars. The value of the fruits, nuts and vegetables shipped out of southern California is put at \$20,000,000.

It is reported from some localities that apple growers are finding trouble in getting barrels for their fruit. Heretofore it has been possible to purchase second-hand barrels at 15 cents each, but for some reason that is now impossible. New barrels cost 35 cents each, and this is a factor in the selling of the fruit. What is the trouble, another trust?

The Live Stock Census.

An agent of the census bureau answering the question what good will the census reports be to the livestock industry? says: "Only this; it forms a basis, every ten years from which may be deducted certain conclusions of value to every cowman and to every citizen who has an interest in this broad land of liberty and civilization. It proves, from decade to decade, facts which otherwise would be mere conjectures, such as the increase in blooded stock, the estimated average cost of production, the availability and resources of the range to supply demands for beef, etc., which go to make up the sum of human government. Taken all over the country, the live stock census is a good move and its figures cannot be used by option dealers for any length of time to hammer prices or influence the markets of supply and demand."

Cost of Pork.

The cost of pork per pound largely regulates the opinions in which farmers hold swine raising. In some localities the farmers claim that they can buy even their own pork cheaper than they can raise it. Where such opinions prevail it is evident that the raisers of swine have been unfortunate in their experiences in producing pork or else do not know what it has really cost them to produce it. At some experiments carried on at the Maryland Experiment Station it was demonstrated that on certain foods pork can be made at a cost of 2 1/2 cents per pound. This of course can be done only under favorable circumstances and where the pigs are kept in healthful conditions. If a large percent of the herd is to be permitted to die of the cholera of course it will not be possible to raise pork at any such figure. As to the cost of pork production, everything depends on the circumstances in which the feeder finds himself, for some have access to cheap feeds that are not in the reach of other farmers. Thus some farmers live near creameries where the skim milk is not valued as it should be and is sold by the creamery manager at one-half cent per gallon to anyone that will take it away. The milk as a producer of pork, combined with other feeds, is worth far more than this, and of course its use by the pig raiser will result in greatly reducing the cost of his product. It is also a well-established principle that pork is produced cheapest on young hogs.

Corn Roots.

H. R. Hilton, in the fourth biennial report of the Kansas state board of agriculture, says: "Figure No. 1 shows the position and distribution of the corn roots in the soil to a depth of 4 1/2 feet, and indicates the office of each class, and their orderly arrangement and development at a certain time for a certain work. The seed roots sustain the bud until the first green leaf appears. The first roots then follow and seek the surface soil, which first feels the sun's warmth. These are in turn supplanted by the first circle roots that radiate from the butt end of the stalk like the ribs of an umbrella from the shaft, and spread out on a lower level, usually five to ten inches below the surface, and often exceed eight feet in length. These first circle roots are the main food gatherers, and send out numerous

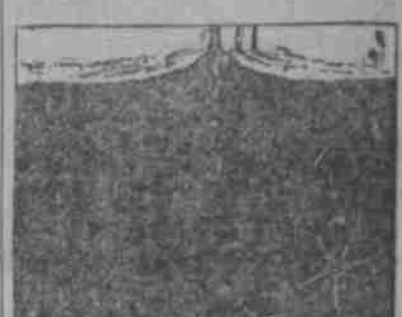


Fig. 1. a, surface roots; b, first circle roots; c, second circle roots; d, third circle roots; e, fourth circle roots; f, fifth circle roots; g, sixth circle roots; h, seventh circle roots; i, eighth circle roots; j, ninth circle roots; k, tenth circle roots; l, eleventh circle roots; m, twelfth circle roots; n, thirteenth circle roots; o, fourteenth circle roots; p, fifteenth circle roots; q, sixteenth circle roots; r, seventeenth circle roots; s, eighteenth circle roots; t, nineteenth circle roots; u, twentieth circle roots; v, twenty-first circle roots; w, twenty-second circle roots; x, twenty-third circle roots; y, twenty-fourth circle roots; z, twenty-fifth circle roots; aa, twenty-sixth circle roots; ab, twenty-seventh circle roots; ac, twenty-eighth circle roots; ad, twenty-ninth circle roots; ae, thirtieth circle roots; af, thirty-first circle roots; ag, thirty-second circle roots; ah, thirty-third circle roots; ai, thirty-fourth circle roots; aj, thirty-fifth circle roots; ak, thirty-sixth circle roots; al, thirty-seventh circle roots; am, thirty-eighth circle roots; an, thirty-ninth circle roots; ao, fortieth circle roots; ap, forty-first circle roots; aqu, forty-second circle roots; ar, forty-third circle roots; as, forty-fourth circle roots; at, forty-fifth circle roots; au, forty-sixth circle roots; av, forty-seventh circle roots; aw, forty-eighth circle roots; ax, forty-ninth circle roots; ay, fiftieth circle roots; az, fifty-first circle roots; ba, fifty-second circle roots; bb, fifty-third circle roots; bc, fifty-fourth circle roots; bd, fifty-fifth circle roots; be, fifty-sixth circle roots; bf, fifty-seventh circle roots; bg, fifty-eighth circle roots; bh, fifty-ninth circle roots; bi, sixtieth circle roots; bj, sixty-first circle roots; bk, sixty-second circle roots; bl, sixty-third circle roots; bm, sixty-fourth circle roots; bn, sixty-fifth circle roots; bo, sixty-sixth circle roots; bp, sixty-seventh circle roots; bq, sixty-eighth circle roots; br, sixty-ninth circle roots; bs, seventieth circle roots; bt, seventy-first circle roots; bu, seventy-second circle roots; bv, seventy-third circle roots; bw, seventy-fourth circle roots; bx, seventy-fifth circle roots; by, seventy-sixth circle roots; bz, seventy-seventh circle roots; ca, seventy-eighth circle roots; cb, seventy-ninth circle roots; cc, eightieth circle roots; cd, eighty-first circle roots; ce, eighty-second circle roots; cf, eighty-third circle roots; cg, eighty-fourth circle roots; ch, eighty-fifth circle roots; ci, eighty-sixth circle roots; cj, eighty-seventh circle roots; ck, eighty-eighth circle roots; cl, eighty-ninth circle roots; cm, ninetieth circle roots; cn, ninety-first circle roots; co, ninety-second circle roots; cp, ninety-third circle roots; cq, ninety-fourth circle roots; cr, ninety-fifth circle roots; cs, ninety-sixth circle roots; ct, ninety-seventh circle roots; cu, ninety-eighth circle roots; cv, ninety-ninth circle roots; cw, one hundredth circle roots; cx, one hundred and first circle roots; cy, one hundred and second circle roots; cz, one hundred and third circle roots; da, one hundred and fourth circle roots; db, one hundred and fifth circle roots; dc, one hundred and sixth circle roots; dd, one hundred and seventh circle roots; de, one hundred and eighth circle roots; df, one hundred and ninth circle roots; dg, one hundred and tenth circle roots; dh, one hundred and eleventh circle roots; di, one hundred and twelfth circle roots; dj, one hundred and thirteenth circle roots; dk, one hundred and fourteenth circle roots; dl, one hundred and fifteenth circle roots; dm, one hundred and sixteenth circle roots; dn, one hundred and seventeenth circle roots; do, one hundred and eighteenth circle roots; dp, one hundred and nineteenth circle roots; dq, one hundred and twentieth circle roots; dr, one hundred and twenty-first circle roots; ds, one hundred and twenty-second circle roots; dt, one hundred and twenty-third circle roots; du, one hundred and twenty-fourth circle roots; dv, one hundred and twenty-fifth circle roots; dw, one hundred and twenty-sixth circle roots; dx, one hundred and twenty-seventh circle roots; dy, one hundred and twenty-eighth circle roots; dz, one hundred and twenty-ninth circle roots; ea, one hundred and thirtieth circle roots; eb, one hundred and thirty-first circle roots; ec, one hundred and thirty-second circle roots; ed, one hundred and thirty-third circle roots; ee, one hundred and thirty-fourth circle roots; ef, one hundred and thirty-fifth circle roots; eg, one hundred and thirty-sixth circle roots; eh, one hundred and thirty-seventh circle roots; ei, one hundred and thirty-eighth circle roots; ej, one hundred and thirty-ninth circle roots; ek, one hundred and fortieth circle roots; el, one hundred and forty-first circle roots; em, one hundred and forty-second circle roots; en, one hundred and forty-third circle roots; eo, one hundred and forty-fourth circle roots; ep, one hundred and forty-fifth circle roots; eq, one hundred and forty-sixth circle roots; er, one hundred and forty-seventh circle roots; es, one hundred and forty-eighth circle roots; et, one hundred and forty-ninth circle roots; eu, one hundred and fiftieth circle roots; ev, one hundred and fifty-first circle roots; ew, one hundred and fifty-second circle roots; ex, one hundred and fifty-third circle roots; ey, one hundred and fifty-fourth circle roots; ez, one hundred and fifty-fifth circle roots; fa, one hundred and fifty-sixth circle roots; fb, one hundred and fifty-seventh circle roots; fc, one hundred and fifty-eighth circle roots; fd, one hundred and fifty-ninth circle roots; fe, one hundred and sixtieth circle roots; ff, one hundred and sixty-first circle roots; fg, one hundred and sixty-second circle roots; fh, one hundred and sixty-third circle roots; fi, one hundred and sixty-fourth circle roots; fj, one hundred and sixty-fifth circle roots; fk, one hundred and sixty-sixth circle roots; fl, one hundred and sixty-seventh circle roots; fm, one hundred and sixty-eighth circle roots; fn, one hundred and sixty-ninth circle roots; fo, one hundred and seventieth circle roots; fp, one hundred and seventy-first circle roots; fq, one hundred and seventy-second circle roots; fr, one hundred and seventy-third circle roots; fs, one hundred and seventy-fourth circle roots; ft, one hundred and seventy-fifth circle roots; fu, one hundred and seventy-sixth circle roots; fv, one hundred and seventy-seventh circle roots; fw, one hundred and seventy-eighth circle roots; fx, one hundred and seventy-ninth circle roots; fy, one hundred and eightieth circle roots; fz, one hundred and eighty-first circle roots; ga, one hundred and eighty-second circle roots; gb, one hundred and eighty-third circle roots; gc, one hundred and eighty-fourth circle roots; gd, one hundred and eighty-fifth circle roots; ge, one hundred and eighty-sixth circle roots; gf, one hundred and eighty-seventh circle roots; gg, one hundred and eighty-eighth circle roots; gh, one hundred and eighty-ninth circle roots; gi, one hundred and ninetieth circle roots; gj, one hundred and ninety-first circle roots; gk, one hundred and ninety-second circle roots; gl, one hundred and ninety-third circle roots; gm, one hundred and ninety-fourth circle roots; gn, one hundred and ninety-fifth circle roots; go, one hundred and ninety-sixth circle roots; gp, one hundred and ninety-seventh circle roots; gq, one hundred and ninety-eighth circle roots; gr, one hundred and ninety-ninth circle roots; gs, one hundred and one hundredth circle roots; gt, one hundred and one hundred and first circle roots; gu, one hundred and one hundred and second circle roots; gv, one hundred and one hundred and third circle roots; gw, one hundred and one hundred and fourth circle roots; gx, one hundred and one hundred and fifth circle roots; gy, one hundred and one hundred and sixth circle roots; gz, one hundred and one hundred and seventh circle roots; ha, one hundred and one hundred and eighth circle roots; hb, one hundred and one hundred and ninth circle roots; hc, one hundred and one hundred and tenth circle roots; hd, one hundred and one hundred and eleventh circle roots; he, one hundred and one hundred and twelfth circle roots; hf, one hundred and one hundred and thirteenth circle roots; hg, one hundred and one hundred and fourteenth circle roots; hh, one hundred and one hundred and fifteenth circle roots; hi, one hundred and one hundred and sixteenth circle roots; hj, one hundred and one hundred and seventeenth circle roots; hk, one hundred and one hundred and eighteenth circle roots; hl, one hundred and one hundred and nineteenth circle roots; hm, one hundred and one hundred and twentieth circle roots; hn, one hundred and one hundred and twenty-first circle roots; ho, one hundred and one hundred and twenty-second circle roots; hp, one hundred and one hundred and twenty-third circle roots; hq, one hundred and one hundred and twenty-fourth circle roots; hr, one hundred and one hundred and twenty-fifth circle roots; hs, one hundred and one hundred and twenty-sixth circle roots; ht, one hundred and one hundred and twenty-seventh circle roots; hu, one hundred and one hundred and twenty-eighth circle roots; hv, one hundred and one hundred and twenty-ninth circle roots; hw, one hundred and one hundred and thirtieth circle roots; hx, one hundred and one hundred and thirty-first circle roots; hy, one hundred and one hundred and thirty-second circle roots; hz, one hundred and one hundred and thirty-third circle roots; ia, one hundred and one hundred and thirty-fourth circle roots; ib, one hundred and one hundred and thirty-fifth circle roots; ic, one hundred and one hundred and thirty-sixth circle roots; id, one hundred and one hundred and thirty-seventh circle roots; ie, one hundred and one hundred and thirty-eighth circle roots; if, one hundred and one hundred and thirty-ninth circle roots; ig, one hundred and one hundred and fortieth circle roots; ih, one hundred and one hundred and forty-first circle roots; ii, one hundred and one hundred and forty-second circle roots; ij, one hundred and one hundred and forty-third circle roots; ik, one hundred and one hundred and forty-fourth circle roots; il, one hundred and one hundred and forty-fifth circle roots; im, one hundred and one hundred and forty-sixth circle roots; in, one hundred and one hundred and forty-seventh circle roots; io, one hundred and one hundred and forty-eighth circle roots; ip, one hundred and one hundred and forty-ninth circle roots; iq, one hundred and one hundred and fiftieth circle roots; ir, one hundred and one hundred and fifty-first circle roots; is, one hundred and one hundred and fifty-second circle roots; it, one hundred and one hundred and fifty-third circle roots; iu, one hundred and one hundred and fifty-fourth circle roots; iv, one hundred and one hundred and fifty-fifth circle roots; iw, one hundred and one hundred and fifty-sixth circle roots; ix, one hundred and one hundred and fifty-seventh circle roots; iy, one hundred and one hundred and fifty-eighth circle roots; iz, one hundred and one hundred and fifty-ninth circle roots; ja, one hundred and one hundred and sixtieth circle roots; jb, one hundred and one hundred and sixty-first circle roots; jc, one hundred and one hundred and sixty-second circle roots; jd, one hundred and one hundred and sixty-third circle roots; je, one hundred and one hundred and sixty-fourth circle roots; jf, one hundred and one hundred and sixty-fifth circle roots; jg, one hundred and one hundred and sixty-sixth circle roots; jh, one hundred and one hundred and sixty-seventh circle roots; ji, one hundred and one hundred and sixty-eighth circle roots; jj, one hundred and one hundred and sixty-ninth circle roots; jk, one hundred and one hundred and seventieth circle roots; jl, one hundred and one hundred and seventy-first circle roots; jm, one hundred and one hundred and seventy-second circle roots; jn, one hundred and one hundred and seventy-third circle roots; jo, one hundred and one hundred and seventy-fourth circle roots; jp, one hundred and one hundred and seventy-fifth circle roots; jq, one hundred and one hundred and seventy-sixth circle roots; jr, one hundred and one hundred and seventy-seventh circle roots; js, one hundred and one hundred and seventy-eighth circle roots; jt, one hundred and one hundred and seventy-ninth circle roots; ju, one hundred and one hundred and eightieth circle roots; jv, one hundred and one hundred and eighty-first circle roots; jw, one hundred and one hundred and eighty-second circle roots; jx, one hundred and one hundred and eighty-third circle roots; jy, one hundred and one hundred and eighty-fourth circle roots; jz, one hundred and one hundred and eighty-fifth circle roots; ka, one hundred and one hundred and eighty-sixth circle roots; kb, one hundred and one hundred and eighty-seventh circle roots; kc, one hundred and one hundred and eighty-eighth circle roots; kd, one hundred and one hundred and eighty-ninth circle roots; ke, one hundred and one hundred and ninetieth circle roots; kf, one hundred and one hundred and ninety-first circle roots; kg, one hundred and one hundred and ninety-second circle roots; kh, one hundred and one hundred and ninety-third circle roots; ki, one hundred and one hundred and ninety-fourth circle roots; kj, one hundred and one hundred and ninety-fifth circle roots; ko, one hundred and one hundred and ninety-sixth circle roots; kp, one hundred and one hundred and ninety-seventh circle roots; kq, one hundred and one hundred and ninety-eighth circle roots; kr, one hundred and one hundred and ninety-ninth circle roots; ks, one hundred and one hundred and one hundredth circle roots; kt, one hundred and one hundred and one hundred and first circle roots; ku, one hundred and one hundred and one hundred and second circle roots; kv, one hundred and one hundred and one hundred and third circle roots; kw, one hundred and one hundred and one hundred and fourth circle roots; kx, one hundred and one hundred and one hundred and fifth circle roots; ky, one hundred and one hundred and one hundred and sixth circle roots; kz, one hundred and one hundred and one hundred and seventh circle roots; la, one hundred and one hundred and one hundred and eighth circle roots; lb, one hundred and one hundred and one hundred and ninth circle roots; lc, one hundred and one hundred and one hundred and tenth circle roots; ld, one hundred and one hundred and one hundred and eleventh circle roots; le, one hundred and one hundred and one hundred and twelfth circle roots; lf, one hundred and one hundred and one hundred and thirteenth circle roots; lg, one hundred and one hundred and one hundred and fourteenth circle roots; lh, one hundred and one hundred and one hundred and fifteenth circle roots; li, one hundred and one hundred and one hundred and sixteenth circle roots; lj, one hundred and one hundred and one hundred and seventeenth circle roots; lk, one hundred and one hundred and one hundred and eighteenth circle roots; ll, one hundred and one hundred and one hundred and nineteenth circle roots; lm, one hundred and one hundred and one hundred and twentieth circle roots; ln, one hundred and one hundred and one hundred and twenty-first circle roots; lo, one hundred and one hundred and one hundred and twenty-second circle roots; lp, one hundred and one hundred and one hundred and twenty-third circle